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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* JONATHAN R. COPPETA

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Appeal 2008-2110  
Application 10/007,502  
Technology Center 1700

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Decided: April 23, 2008

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Before BRADLEY R. GARRIS, CATHERINE Q. TIMM, and  
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

1 Appellant appeals under 35 U.S.C. § 134 the final rejection of claims  
1-20. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We REVERSE.

INTRODUCTION

Appellant claims a method for fabricating micro-optical elements comprising, in relevant part, forming topographic features on an optical element substrate and mechanically polishing the substrate surface to modify

the features to produce curved optical surfaces on the optical element substrate (claim 1; Figures 1A to 1C).

Claim 1 is illustrative:

1. A method for fabricating micro-optical elements, comprising:

forming topographic features on a surface of an optical element substrate;

mechanically polishing the surface of the substrate to modify the features to produce curved optical surfaces on the optical element substrate; and

dicing the substrate into the optical elements.

The Examiner relies on the following prior art references as evidence of unpatentability:

Meyers	4,451,119	May 29, 1984
Kane	4,524,127	Jun. 18, 1985
Yoshida	5,500,869	Mar. 19, 1996
Hawkins	5,824,236	Oct. 20, 1998

The rejections as presented by the Examiner are as follows:

1. Claims 1-9, 11-15, 17, and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kane in view of Hawkins and Yoshida.
2. Claims 10, 16, 19, and 20 are rejected under 35 U.S.C. § 103 over Kane in view of Hawkins, Yoshida and Meyers.

## OPINION

Appellant argues that none of the references teaches or suggests “mechanically polishing the surface of the substrate to modify the features to

produce curved optical surfaces on the optical element substrate” as required by independent claim 1, or “mechanically polishing the surface of the substrate to modify the blind holes to produce curved, concave optical surfaces on the optical element substrate” as required by independent claim 16 (Br. 4 and 6). Appellant contends that Kane uses only a chemical etching process to form the curved optical elements, and Hawkins merely discloses that chemical mechanical polishing (CMP) may be used to produce flat, planarized surfaces, not curved optical elements (Br. 4 and 5).

Regarding the argued claim features, the Examiner finds that Hawkins discloses that chemical polishing and mechanical polishing are functional equivalents such that it would have been obvious to substitute Hawkins’ mechanical polishing for Kane’s chemical polishing because such are functional equivalents and mechanical polishing would increase the polishing rate (Ans. 4 and 6).

We have considered and agree with Appellant’s arguments. We cannot sustain the Examiner’s rejection for the reasons below.

The Examiner bears the initial burden of establishing a *prima facie* case. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). To establish a *prima facie* case of obviousness all the claim features must be taught by the prior art. *In re Royka*, 490 F.2d 981, 985 (CCPA 1974). Hindsight must not be used in the selection of references that comprise the case of obviousness. *In re Rouffet*, 149 F.3d 1350, 1358 (Fed. Cir. 1998). If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent. *Oetiker*, 977 F.2d at 1445.

Kane discloses a method of fabricating a silicon lens array (Kane, col. 1, ll. 5-7). Kane discloses anisotropically etching a silicon wafer to form V-grooves (Kane, col. 2, ll. 48-67; col. 3, ll. 1-5). Kane discloses chemically etching the V-grooves to remove the silicon shoulders and form a cylindrical profile (Kane, col. 3, ll. 12-34). Kane does not disclose mechanically polishing the V-grooves to form the cylindrical profile.

Hawkins discloses a method of making solid state imagers having planar lens arrays formed from one or more layers of inorganic materials (Hawkins, col. 1, ll. 17-20). Hawkins discloses using CMP to form an optically flat surface 100a on a dielectric material 100 (Hawkins, col. 4, ll. 49-65; Figure 3C). Hawkins discloses masking the optically flat surface 100a and then etching the dielectric layer 100 to form depressions 120 (Hawkins, col. 5, ll. 1-20; Figures 3E and 3F). The lens material 130 is deposited on top of the dielectric material 100 and into the depressions 120 (Hawkins, col. 5, ll. 21-27; Figure 3G). The lens material 130 is subsequently planarized optically flat by using CMP so as to remove the lens material from the optically flat surface 100a but leave the lens material in the depressions 120 to form lenses 132 (Hawkins, col. 5, ll. 27-40; Figure 3H). Hawkins discloses that the lenses 132 are coplanar with the optically flat surface 100a of the dielectric layer 100 (Hawkins, col. 5, ll. 34-37).

Neither Kane's nor Hawkins' disclosures teach or suggest using chemical mechanical polishing (i.e., mechanical polishing) to modify topographic features or blind holes to produce curved optical surfaces on the optical elements as required by the claims. Rather, Kane only discloses using chemical etching to form the curved optical surfaces and Hawkins only discloses using chemical mechanical polishing to form optically flat

surfaces. Accordingly, we agree with Appellant that the argued claim feature is not taught or suggested by the prior art.

Furthermore, we discern no reason, absent hindsight, for substituting Hawkins' chemical mechanical polishing for Kane's chemical etching. The Examiner states that motivation for the combination lies in the functional equivalency of chemical polishing and mechanical polishing as established by Hawkins, and that using mechanical polishing would increase the polishing rate (i.e., decrease the processing time) (Ans. 4). However, the Examiner has not pointed to any evidence of record to support the proposition that mechanical polishing would increase the polishing rate relative to chemical etching alone.

Moreover, the issue presented by § 103 is one of obviousness, not equivalence. The Examiner points to column 8, lines 18-35 as establishing the functional equivalency of chemical and mechanical polishing (Ans. 4). However, Hawkins discloses that either "isotropic etching" or chemical mechanical polishing may be used to remove optically flat surface 100a and form a new optically flat surface 100b (Hawkins, col. 8, ll. 29-35). It is not clear if the Examiner is equating isotropic etching with chemical etching. Nevertheless, even if Hawkins establishes that chemical polishing (i.e., isotropic etching) and mechanical polishing are functionally equivalent, Hawkins' only disclosed function of these equivalent polishing processes is to form optically flat surfaces, not curved surfaces. Stated differently, neither Kane's nor Hawkins' disclosures would have suggested modifying a topographic feature or blind hole by mechanically polishing to form curved optical surfaces. *In re Edge*, 359 F.2d 896, 899 (CCPA 1966) ("Expedients

Appeal 2008-2110  
Application 10/007,502

which are functionally equivalent to each other are not necessarily obvious in view of one another.”).

Because we find that the mechanical polishing claim feature is not taught or suggested by the prior art, and the Examiner’s combination is based on impermissible hindsight, we determine that no *prima facie* case of obviousness has been established by the Examiner. Accordingly, we do not sustain the Examiner’s § 103 rejection of claims 1-9, 11-15, 17, and 18 over Kane in view of Hawkins and Yoshida, or the § 103 rejection of dependent claims 10, 16, 19, and 20 over Kane in view of Hawkins, Yoshida and Meyers.

## DECISION

The Examiner’s decision is reversed.

REVERSED

tf/ls

HOUSTON ELISEEVA LLP  
4 MILITIA DRIVE  
SUITE 4  
LEXINGTON, MA 02421